CLAIMS

What is claimed is:

1. A system for controlling a velocity vector of an overhead crane, comprising:

a motor engaging the overhead crane to move the overhead crane and having an output vector;

a variable frequency drive operatively connected to the motor to transfer a level of voltage, a level of current, and a frequency level for operation of the motor;

a processing unit operatively connect to the motor and the variable frequency drive; and

wherein the processing unit converts the output vector to an amount of voltage, an amount of current, and a frequency and maintains the frequency level transferred from the variable frequency drive to the motor substantially equal to the frequency in the motor.

2. The system of claim 1, where the output vector includes a rotational direction and a rotational speed.

3. The system of claim 2, further including a sensor operatively connect to the motor and the variable frequency drive, wherein the sensor

converts the output vector to an electronic signal and sends the electronic signal to the processing unit.

4. The system of claim 1, wherein the velocity vector includes a traverse direction and a speed.

5. The system of claim 1, further including:

a control switch operatively connected to the processing unit to regulate the velocity vector of the crane; and

a brake operatively connected to the crane, the motor, and the variable frequency drive to regulate the velocity vector of the crane.

6. The system of claim 5, wherein the positioning of the control switch determines the level of voltage and the level of current transferred from the variable frequency drive to the motor.

7. The system of claim 5, wherein the hydraulic brake is a manual hydraulic foot brake.

8. A system for controlling a direction of movement and a velocity of an overhead bridge crane, comprising:

a motor attached to the crane, having an output vector, and positioned to move the overhead crane proportional to the output vector;

a variable frequency drive operatively connected to the motor, and positioned to transfer a level of voltage, a level of current, and a frequency level to the motor;

a control switch operatively connected to the variable frequency drive to regulate the direction of movement and the velocity of the crane;

a hydraulic brake operatively connected to the motor and the variable frequency drive to decrease the velocity of the crane;

a processing unit operatively connected to the motor and the variable frequency drive;

wherein the processing unit converts the output vector to an amount of voltage, an amount of current, and frequency and maintains the frequency level transferred from the variable frequency drive to the motor substantially equal to the frequency in the motor; and

wherein positioning of the control switch varies the level of voltage and the level of current transferred by the variable frequency drive to the motor to control the direction of movement and velocity.

9. A method of using a motor having a rotational direction and a rotational speed to control the direction of movement and the velocity of an overhead bridge crane, comprising:

a) determining the direction of movement and velocity of the crane by monitoring the rotational direction and the rotational speed of the motor;

b) converting the rotational direction and rotational speed of the motor to an amount of voltage, an amount of current, and a frequency;

c) substantially corresponding a frequency level sent to the motor to the frequency in motor;

d) regulating a level of voltage and a level of current sent to the motor to control the direction of movement and the velocity of the crane.

10. The method of claim 9, wherein step c) occurs before step d).

11. The method of claim 10, further including step e) of using a manual brake to varying the velocity of the crane.

12. The method of claim 9, wherein step c) further includes positioning a control switch to determine the level of voltage and the level of current transferred to the motor.

13. A method of using a motor having a rotational direction and a rotational speed and a control switch to control the direction of movement and the velocity of an overhead bridge crane, comprising:

a) determining the direction of movement and velocity of the crane by monitoring the rotational direction and rotational speed of the motor;

b) converting the rotational direction and rotational speed of the motor to an amount of voltage, an amount of current, and a frequency;

c) maintaining the frequency in the motor;

d) determining the desired direction of movement and velocity of the crane by monitoring the movement of the control switch;

e) converting the desired direction of movement and velocity of the crane to a level of voltage and a level of current to regulate the movement of the control switch; and

f) sending the level of voltage and the level of current to the motor.

14. The method of claim 13, wherein step c) includes substantially corresponding the frequency level sent to the motor to the frequency in motor before performing step e).

15. A method of smoothly adjusting the velocity of an overhead bridge crane, comprising:

a) providing a motor and a variable frequency drive operatively connected to the motor;

b) determining an amount of voltage, an amount of current, and frequency in the motor and a conversion level of voltage, a conversion level of current, and a conversion frequency level sent from the variable frequency drive to the motor;

c) maintaining the conversion frequency level transferred from the variable frequency drive substantially equal to the frequency of the motor;

d) converting a desired velocity of the crane to a desired amount of voltage and a desired amount of current; and

e) adjusting the level of voltage and the level of current in the motor to the desired amount of voltage and the desired amount of current.

16. An overhead crane comprising:

a traveling bridge movable with a speed and a direction defining a crane velocity vector;

a crane master switch adapted to allow a user of the crane to selectably control the crane velocity vector, the master switch including forward, neutral, and reverse positions;

an electric motor having a rotating motor shaft operatively coupled to the traveling bridge, the motor operable at variable shaft speeds and directions defining a motor output vector;

a variable frequency motor drive having a drive output electrically coupled to the motor to provide operating voltage and current for the motor, an output vector input electrically coupled to the motor to receive an output vector signal corresponding to the motor output vector, and a master switch input electrically connected to receive a master switch control signal from the master switch;

the motor drive including a processing unit, the processing unit responsive to the master switch control signal and the output vector signal to control the motor operating voltage and current; and

the processing unit further responsive to the master switch control signal to provide a speed match before adjusting the motor operating voltage and current to match the motor output vector when the master switch is moved from the neutral position to either of the forward or reverse positions.

17. The overhead crane of claim 16 further comprising a shaft sensor operative to sense the motor shaft speed and direction and to provide the output vector signal to the output vector input.

18. The overhead crane of claim 16 wherein the master switch control signal includes a run command signal and a variable torque reference signal.

19. The overhead crane of claim 18 wherein the processing unit is responsive to the variable torque reference signal to control acceleration and deceleration of the motor.

20. The overhead crane of claim 16 further comprising

a hydraulic crane brake;

a crane brake control, the crane brake control operative to control the hydraulic crane brake;

the crane brake control including a brake switch responsive to movement of the crane brake control to generate a crane brake activation signal;

the motor drive having a brake control input electrically coupled to the brake switch; and

the processing unit further responsive to the crane brake activation signal, the master switch control signal, and the output vector signal to prevent the motor from driving the crane bridge against the hydraulic brake.

21. A control system for a crane, the crane having a master switch control signal and a motor with an operating voltage, an operating current,

an operating frequency and an output vector signal, the control system comprising:

a motor drive having a drive output adapted to electrically control the motor, an output vector input adapted to receive the output vector signal, and a master switch input adapted to receive the master switch control signal;

the motor drive including software responsive to the master switch control signal and the output vector signal and adapted to control the operating voltage and operating current;

the software further adapted to provide a speed match by adjusting the operating frequency and operating voltage to match the output vector signal before the master switch control signal changes; and

a sensor adapted to transfer the output vector signal to the output vector input.

22. A method of substantially eliminating the open circuit voltage decay of a motor of an overhead bridge crane, the motor having a present voltage at a present frequency, the method comprising:

a) providing a variable frequency drive operatively connected to the motor;

b) determining the present voltage and the present frequency in the motor; and

c) transferring a voltage level at a frequency level from the variable frequency drive substantially equal to the present voltage and the present frequency in the motor to keep the motor magnetized and to substantially eliminate the open circuit voltage decay of the motor.

23. A method of preventing a motor from driving into a brake when applied to slow an overhead bridge crane in a direction of movement, the motor having a torque input, the method comprising:

a) determining the direction of movement of the crane;

b) determining the torque input in the motor;

b) determining the application of the brake; and

c) setting the torque input to approximately zero when the brake has been applied and the torque input is proportional to the direction of movement.